



|  |   |            |
|--|---|------------|
| 1449 U.S. DEPARTMENT OF COMMERCE<br>PATENT AND TRADEMARK OFFICE<br><br><b>SUPPLEMENTAL<br/>         INFORMATION DISCLOSURE<br/>         STATEMENT BY APPLICANT</b> | ATTY DOCKET NO.                               | SERIAL NO. |
|  | 372584-00102                                  | 10/644,227 |
|  | APPLICANT<br><br>TAFT III, Karl Milton et al. |            |
|  | FILING DATE                                   | GROUP      |
|  | August 19, 2003                               | 1745       |

### U.S. PATENT DOCUMENTS

| EXAMINER INITIALS | CITE No. | DOCUMENT NUMBER | DATE       | NAME             | CLASS | SUB CLASS | FILING DATE If appropriate |
|-------------------|----------|-----------------|------------|------------------|-------|-----------|----------------------------|
| BFB               | AA       | 5,523,181       | 06/04/1996 | Stonehart et al. | 429   | 192       |                            |
| BFB               | AB       | 5,977,241       | 11/02/1999 | Koloski et al.   | 524   | 502       |                            |
| BFB               | AC       | 6,548,590       | 04/15/2003 | Koloski et al.   | 524   | 492       |                            |
| BFB               | AD       | 2004/0019143    | 01/29/2004 | Koloski et al.   | 524   | 434       |                            |
| BFB               | AE       | 2004/0137303    | 07/15/2004 | Koloski et al.   | 429   | 35        |                            |

### FOREIGN PATENT DOCUMENTS

| EXAMINER INITIALS | CITE No. | DOCUMENT NUMBER | DATE | COUNTRY | NAME | CLASSIFICATION |
|-------------------|----------|-----------------|------|---------|------|----------------|
|-------------------|----------|-----------------|------|---------|------|----------------|

### NON-PATENT DOCUMENTS

| EXAMINER INITIALS | CITE No. | INCLUDE AS APPLICABLE: AUTHOR, TITLE DATE, PUBLISHER, EDITION OR VOLUME, PERTINENT PAGES)   |
|-------------------|----------|---|
| BFB               | AF       | ADJEMIAN, K.T. et al.; "Silicon Oxide Nafion Composite Membranes for Proton-Exchange Membrane Fuel Cell Operation at 80-140° C"; Journal of The Electrochemical Society, 149 (3) A256-A261 (2002) * |
| BFB               | AG       | ANTONUCCI, P.L. et al.; "Investigation of a direct methanol fuel cell based on a composite Nafion®-silica electrolyte for high temperature operation"; Solid State Ionics 125 (1999) 431-437 *      |
| BFB               | AH       | AHN, Sang-Yeoul et al.; "Properties of the reinforced composite membranes formed by melt soluble ion conducting polymer resins for PEMFCs"; Electrochimica Acta xxx (2004) xxx *                    |
| BFB               | AI       | ARICO, A.S. et al.; "Surface Properties of inorganic fillers for application in composite membranes-direct methanol fuel cells"; Journal of Power Sources 128 (2004) 113-118 *                      |
| BFB               | AJ       | BOYSEN, S.A. et al.; "Polymer Solid Acid Composite Membranes for Fuel-Cell Applications"; Journal of The Electrochemical Society, 147 (10) 3610-3613 (2000) *                                       |
| BFB               | AK       | CHANG, Jae-Hyuk et al.; "Proton-conducting composite membranes derived from sulfonated hydrocarbon and inorganic materials"; Journal of Power Sources 124 (2003) 18-25 *                            |
| BFB               | AL       | CHEN, Sheng-Li et al.; "Ion exchange resin/polystyrene sulfonate composite membranes for PEM fuel cells"; Journal of Membrane Science xxx (2004) xxx-xxx *  |
| BFB               | AM       | DENQ, Q. et al.; "Nafion/ORMOSIL Hybrids via <i>in Situ</i> Sol-Gel Reactions. 3. Pyrene Fluorescence Probe Investigation of Nanoscale Environment"; Chem Matter. (1997), 9, 36-44 *                |

\* No month available

|     |    |  |
|-----|----|--|
| BFB | AN | DENG, Q. ET AL.; "Nafion®/(SiO <sub>2</sub> , ORMOSIL, and Dimethylsiloxane) Hybrids Via In Situ Sol-Gel Reactions; Characterization of Fundamental Properties"; Journal of Applied Polymer Science, Vol.68, 747-763 (1998) ✕                    |
| BFB | AO | EASTON, E.B.; "Characteristics of Ppyrrole/Nafion composite Membranes in a Direct Methanol Fuel Cell"; Journal of The Electrochemical Society, 150 (10) C735-C739 (2003) ✕   |
| BFB | AP | FUJINAMI, T. et al.; "Proton conducting borosiloxane-poly(ether-sulfone) composite electrolyte"; Electrochimica Acta xxx (2004) xxx-xxx ✕  |
| BFB | AQ | JUNG, D.H. et al.; "Performance evaluation of a Nafion/silicon oxide hybrid membrane for direct methanol fuel cell"; Journal of Power Sources 106 (2002) 173-177 ✕   |
| BFB | AR | KIM, D. et al. "Nano-silica layered composite membranes prepared by PECVD for direct methanol fuel cells"; Electrochemistry Communications 6 (2004) 1069-1074 ✕  |
| BFB | AS | KIM, Young-Taek et al.; "Nafion/ZrSPP composite membrane for high temperature operation of PEMFCs"; Electrochimica Acta xxx (2004) xxx-xxx ✕   |
| BFB | AT | KIM, Y.M. et al.; "Organic-inorganic composite membranes as addition of SiO <sub>2</sub> for high temperature-operation in polymer electrolyte membrane fuel cells (PEMFCs)"; Electrochimica Acta 49 (2004) 4787-4796 ✕                          |
| BFB | AU | KUMAR, B. et al.; "Polymer-ceramic composite protonic conductors"; Journal of Power Sources 123 (2003) 132-136 ✕   |
| BFB | AV | KWAK, Sang-Hee et al.; "Polymer composite membrane incorporated with a hygroscopic material for high-temperature PEMFC"; Electrochimica Acta xxx (2004) xxx-xxx ✕  |
| BFB | AW | MAURITZ, K.A.; "Organic-inorganic hybrid materials; perfluorinated ionomers as sol-gel polymerization templates for inorganic alkoxides"; Materials Science and Engineering C 6 (1998) 121-133 ✕   |
| BFB | AX | NAKAJIMA, H. et al.; "High Temperature Proton Conducting Organic/Inorganic Nanohybrids for Polymer Electrolyte Membrane"; Journal of The Electrochemical Society, 149, (8) A953-A959 (2002) ✕  |
| BFB | AY | NAKAMOTO, N. et al.; "Medium temperature operation of fuel cells using thermally stable proton-conducting composite sheets composed of phosphosilicate gel and polyimide"; Journal of Power Sources xxx (2004) xxx-xxx ✕                         |
| BFB | AZ | PARK, Y.S.; "High proton-conducting Nafion/calcium hydroxyphosphate composite membranes for fuel cells"; Electrochimica Acta xxx (2004) xxx-xxx ✕  |
| BFB | BA | RAMINI, V. et al.; "Investigation of Nafion®HPA composite membranes for high temperature/low relative humidity PEMFC operation"; Journal of Membrane Science 232 (2004) 31-44 ✕  |
| BFB | BB | RAMINI, V. et al.; "Stabilized heteropolyacid/Nafion® composite membranes for elevated temperature/low relative humidity PEFC operation"; Electrochimica Acta xxx (2004) xxx-xxx ✕   |
| BFB | BC | SAVADOGO, O.; "Emerging membranes for electrochemical systems Part II. High temperature composite membranes for polymer electrolyte fuel cell (PEFC) applications"; Journal of Power Sources 127 (2004) 135-161 ✕                                |
| BFB | BD | SHAO, Zhi-Gang et al.; "Preparation and characterization of hybrid Nafion-silica membrane doped with phosphotungstic acid for high temperature operation of proton exchange membrane fuel cells"; Journal of Membrane Science 229 (2004) 43-51 ✕ |
| BFB | BE | SHIM, J. et al.; "Characteristics of the Nafion ionomer-impregnated composite membrane for polymer electrolyte fuel cells"; Journal of Power Sources 109 (2002) 412-417 ✕  |
| BFB | BF | SI, Y. et al.; "Nafion-Teflon-Zr(HPO <sub>4</sub> ) <sub>2</sub> Composite Membranes for High-Temperature PEMFCs"; Journal of The Electrochemical Society 151 (4) A623-A631 (2004) ✕   |
| BFB | BG | VERNON, D.R. et al.; "Synthesis, characterization, and conductivity measurements of hybrid membranes containing a mono-lacunary heteropolyacid for PEM fuel cell applications"; Journal of Power Sources xxx (2004) xxx-xxx ✕                    |
| BFB | BH | YANG, C. et al.; "A comparison of physical properties and fuel cell performance of Nafion and zirconium phosphate/Nafion composite membranes"; Journal of Membrane Science 237 (2004) 145-161 ✕  |
| BFB | BI | YOUNG, S.K. et al.; "Nafion®/Organically Modified Silicate) Nanocomposites via Ppolymer in situ Sol-Gel Reactions; Mechanical Tensile Properties"; Journal of Polymer Science: Part B; Polymer Physics, vol. 40, 2237-2247 (2002) ✕              |

\* no month available

|     |    |   |
|-----|----|---|
| BFB | BJ | ZOPPI, R.A. et al.; "Electrochemical impedance studies of hybrids of perfluorsulfonic acid ionomer and silicon oxide by sol-gel reaction from solution"; <i>Journal of Electroanalytical Chemistry</i> 445 (1998) 39-45 |
| BFB | BK | ZOPPI, R.A. et al.; "Hybrids of perfluorosulfonic acid ionomer and silicon oxide by sol-gel reaction from solution: Morphology and thermal analysis"; <i>Polymer</i> Vol. 39 Nos. 6-7, pp. 1309-1315 (1997)             |

|  |                                  |
|--|----------------------------------|
| EXAMINER<br><i>Bruce Beu</i>   | DATE CONSIDERED<br><i>1/4/05</i> |
| EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant |                                  |